OTIF

ORGANISATION INTERGOUVERNEMENTALE POUR LES TRANSPORTS INTERNATIONAUX FERROVIAIRES

ZWISCHENSTAATLICHE ORGANISATION FÜR DEN INTERNATIONALEN EISENBAHNVERKEHR

INTERGOVERNMENTAL ORGANISATION FOR INTERNATIONAL CARRIAGE BY RAIL

OTIF/RID/CE/GTP/2012/8

26 September 2012

Original: English

RID: **1st Session of the RID Committee of Experts' standing working group**
(Riga, 12 – 15 November 2012)

Subject: Report on a rail accident at Kijfhoek marshalling yard (near Zwijndrecht) on 14 January 2011

Transmitted by the Netherlands

Photo 1

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1. Introduction

On the evening of Friday, 14 January 2011, a tank wagon with ethanol caught fire after a collision at the marshalling yard in Kijfhoek. No casualties were involved.

Photo 2

Kijfhoek track no.	**Wagons and dangerous goods involved (see also photo 1)**
132	covered wagons loaded with steel (1 wagon caught fire)
131	20 tank wagons loaded with UN 1170 ethanol (*1 wagon caught fire*), 2 tank wagons with UN 1131, 1 tank wagon empty uncleaned of UN 2447 and 1 wagon loaded with a tank-container empty uncleaned of UN 3394
130	Empty track
129	23 tank wagons, empty and cleaned of LPG

2. The accident in chronological order

a. The shunting process led to a collision

By means of hump shunting, 2 sets each composed of 4 wagons rolled to their destination track at too high a speed. As a consequence, a severe collision took place with wagons that were already on that track and between both sets of 4 wagons.

b. The collision led to wagon damage and fire

After the first collision one set of wagons rolled back. The damage picture and calculation demonstrated that the second collision was the most severe and occurred at an impact speed of around 24 km/h. During these collisions the frames of some wagons buckled. The buckle in the frame of one wagon was such that the tank leaked ethanol, which then caught fire. The frame of this wagon had one beam in the middle of the car. This beam serves to connect the two wagon ends (for longitudinal forces from the buffers) and to support the tank. Other tank-wagons in the train had two beams, one left and one right, in line with the buffers.

c. Fire-fighting

During the fire-fighting it appeared that the paperwork on the dangerous goods did not always correspond to the actual contents and location of the wagons in the marshalling yard. At first a risk of explosion was expected from two LPG tank-wagons that were situated on the second track (no.

129) next to the track (no. 131) with the burning ethanol wagon. At a later stage it appeared that these two wagons were empty and cleaned. Certain wagons with dangerous goods were also situated where they should not have been according to the paperwork.

3. Crash resistance of wagons

The Dutch Safety Board carried out an exploratory study on the crash resistance of wagons and mentioned the following:

The consequences (fire) of the accident seem to be relatively high at an impact speed of around 30 km/h.

With respect to crash resistance the buffers and frames of wagons are important. In a collision the buffers can only absorb part of the impact energy. Wagon frames must be sufficiently strong to transfer the remaining energy to the adjacent wagon.

Buffers

The buffers fitted should not be expected to absorb the entire impact[1]. The impact was too strong. Part of the impact energy must be transformed into the deformation of the wagons, as happened in the accident.

In the burnt out wagon and some other wagons involved in the collision the buckle occurred on the same spot of the frame; the buckle was most severe in the burnt out ethanol wagon, which endured the highest impact (see photos 3-6).

Crash buffers

Nowadays more crash resistant buffers (so called crash buffers) are on the market, which can absorb more energy[2]. These crash buffers are only obligatory for goods that are more dangerous than ethanol. Crash buffers could reduce the consequences of the accident, but the investigation has not demonstrated that with certainty.

4. Some lessons to be learned

- The information on marshalling yards with respect to the presence and location of dangerous goods wagons appeared not to be optimal in terms of giving the fire fighters the information needed for a quick and adequate emergency response. Further investigation by the Human Environment and Transport Inspectorate showed that the information flow should be improved at other marshalling yards as well. Arrangements to be made between the infrastructure manager and freight carriers to improve the information flow needed for a quick and adequate emergency response are still under discussion.

- The consequences (fire) of the collision were relatively severe. Improving the crash resistance of wagons should be considered. Crash buffers can limit the damage.

[1] The 4 buffers involved in the accident can absorb 50 kJ energy in total according to UIC leaflet 526-1, 1981 "Wagons – Buffers with a stroke of 105 mm", while each wagon possessed about 2000 kJ kinetic energy. The UIC leaflet prescribes impact tests to demonstrate the wagon strength and functioning of buffers. These tests are related to an impact speed of 12 km/h. In the accident the speed was more than twice as fast and as a consequence the energy to be absorbed was 4 times higher than the energy used for the construction of a wagon.

[2] Up to 400 kJ per buffer, so 1600 kJ per collision between two wagons.

Photos of burnt out tank wagon with buckled supporting beam

Photo 3

Photo 4

Photo5

Photo 6

1. Mode

X Rail Wagon number (optional): 3387 7853 073-7	□ Road Vehicle registration (optional): ……

2. Date and location of occurrence

Year: 2011 Month: January Day: 14 Time: 21:35

□ Station X Shunting/marshalling yard □ Loading/unloading/transhipment site Location / Country: Kijfhoek / Netherlands or □ Open line Description of line: Kilometres:	Road □ Built-up area □ Loading/unloading/transhipment site □ Open road Location / Country: ……

3. Topography

□ Gradient/incline
□ Tunnel
□ Bridge/Underpass
□ Crossing

4. Particular weather conditions

□ Rain
□ Snow
□ Ice
□ Fog
□ Thunderstorm
□ Storm

Temperature: 7 °C

5. Description of occurrence

□ Derailment/Leaving the road
X Collision
□ Overturning/Rolling over
□ Fire
□ Explosion
□ Loss
□ Technical fault

Additional description of occurrence:

Collision and subsequent leaking of the shell and catching fire of the released product, during hump shunting of wagon 3387 7853 073-7 loaded with 58 738 kg ethanol (HIN 33/UN 1170) .....

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6. Dangerous goods involved

UN Number[1]	Class	Packing Group	Estimated quantity of loss of products (kg or l)[2]	Means of containment[3]	Means of containment material	Type of failure of means of containment[4]
1170	3	II	58 738 kg	7	steel	1/2

[1] For dangerous goods assigned to collective entries to which special provision 274 applies, also the technical name shall be indicated.

[2] For Class 7, indicate values according to the criteria in 1.8.5.3.

[3] Indicate the appropriate number
1 Packaging
2 IBC
3 Large packaging
4 Small container
5 Wagon
6 Vehicle
7 Tank-wagon
8 Tank-vehicle
9 Battery-wagon
10 Battery-vehicle
11 Wagon with demountable tanks
12 Demountable tank
13 Large container
14 Tank-container
15 MEGC
16 Portable tank

[4] Indicate the appropriate number
1 Loss
2 Fire
3 Explosion
4 Structural failure

7. Cause of occurrence (if clearly known)

□ Technical fault
□ Faulty load securing
X Operational cause (rail operation)
□ Other: ……

8. Consequences of occurrence

Personal injury in connection with the dangerous goods involved:
□ Deaths (number: ....)
□ Injured (number: ....)

Loss of product:
X Yes
□ No
□ Imminent risk of loss of product

Material/Environmental damage:
□ Estimated level of damage ≤ 50,000 Euros
X Estimated level of damage > 50,000 Euros

Involvement of authorities:
X Yes →
- X Evacuation of persons for a duration of at least three hours caused by the dangerous goods involved
- X Closure of public traffic routes for a duration of at least three hours caused by the dangerous goods involved

□ No

If necessary, the competent authority may request further relevant information.